

REMARKS

Claims 1-17 are present in this application. Claims 1, 14, 16, and 17 are independent claims.

Claim Objection

Claims 6-13 have been objected to for being in improper multiple dependent form. Applicants have amended the claims to remove improper multiple dependencies. Applicants request that the claims be reconsidered and that the objection be withdrawn.

§ 102(b) Rejection – Koshino

Claims 1-5 and 14-17 have been rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent 5,539,502 (Koshino). Applicants have amended claims 1, 14, 16, and 17. Applicants traverse this rejection based on the claims as amended.

Support for the claim amendments is provided on pages 36-39 of the present specification.

Summary of the Present Invention

The present invention solves problems found in remaining amount detecting apparatuses that contain a magnet piece 104 disposed on an end of a rotating portion and that moves sliding on an upper surface of a toner layer 200. In a conventional remaining amount detecting apparatus, the movement path of the permanent magnet piece changes and may be mistakenly detected that the toner is exhausted (specification at paragraph bridging pages 8-9).

In the present remaining amount detecting apparatus, a holding member (e.g. holding member 22) that is flexible has one end thereof connected to the outer periphery of a stirring member (e.g. stirring wing portion 16) that rotates and stirs the toner stored in the housing. A detection auxiliary member (e.g. detection auxiliary member 21) is held by the other end of the

holding member and disposed in the housing (specification at paragraph bridging pages 12-13). Subsequently, when the stirring member rotates in the toner layer, the holding member can rotationally move smoothly while bending along the movement path formed in the toner layer by the outer periphery of the stirring member (Fig. 3). When the amount of toner decreases such that the stirring member no longer rotates in the toner layer, the movement path is not formed in the toner. Instead, the detection auxiliary member increases the rotation radius due to the empty weight, and rotationally moves with a rotation radius larger than the outer periphery of the stirring member in a manner that the detection auxiliary member rotationally moves on the upper surface of the toner layer while being in contact therewith (paragraph bridging pages 13-14; Fig. 4).

A scraping-out member (e.g. scraping out member 12) is disposed to the second outer periphery of the stirring member 11. The scraping-out member is formed so that the cross section shape perpendicular to the stirring axial line L15 has a substantially V-letter shape. A free end of the scraping-out member 12 can elastically abut against the inner peripheral surface of at least the lower portion b of the housing 8. (specification at para. bridging pages 36-38).

The configuration of the scraping-out member enables substantially homogeneously stirring of the toner in the housing. Furthermore, the scraping-out member can prevent aggregation of toner in some parts, leading to false detection of the remaining amount of the toner. Subsequently, the remaining amount of toner can be detected with a high degree of accuracy.

A detecting means (e.g. detecting component 2) detects a distance to the detection auxiliary member. (specification at page 14). A calculating means (e.g. CPU 24; para. bridging pages 48-49) calculates the remaining amount of the toner based on the distance from the detecting means to the detection auxiliary member. When the distance to the detection auxiliary member becomes small, the calculating means determines that the amount of toner is equal to or less than the specified amount, and calculates the remaining amount of the toner stored in the housing. (specification at page 15).

Koshino

Koshino discloses a developing unit having a magnetic resistance type sensor for detecting the remaining amount of the toner in the first toner replenishment chamber (col. 2, lines 17-22; col. 7, lines 34-37). A voltage is outputted from the sensor. Koshino discloses an object to reduce the torque for driving the toner transporting flexible sheets, and to cause a smooth flow of the toner transporting flexible sheets between toner replenishment chambers (col. 3, lines 12-20). Koshino's device includes toner replenishment chambers, each provided with a rotation frame, to the end portion to which a toner transporting flexible sheet is attached. Flexible sheets have a flexible base film 18a and a friction film 18b laminated on the tip portion. (col. 7, lines 4-26). The friction film brings the toner forwardly due to friction between the toner and the friction film (Abstract). However, when the amount of toner is reduced, the sheet is restored to its original shape to contact the inner surface of the chamber and the resistance of the toner against the toner transport sheets is relatively small. In such case, rotation frames can be driven at a relatively small torque. (col. 7, lines 51-58).

Differences over Koshino

The Examiner alleges that base film 18a teaches the claimed detection auxiliary member, magnetism resistance type magnetic sensor 14 teaches the claimed detecting means, and that column 2, lines 17-22 teaches the claimed calculation of the remaining amount of the toner based on the distance from the detecting means to the detection auxiliary member.

Applicants submit that Koshino does not teach the claimed "detection auxiliary member," held by an end of a flexible holding member and used in calculation of the remaining amount of the toner based on the distance from the detecting means. In the present invention, the detecting means (e.g., 2) detects a distance to the detection auxiliary member, which is for example a magnet, based on a change of a magnetic field in the detection position by the detection auxiliary member (specification at page 47, first full paragraph). In Koshino, friction film 18b brings the toner forwardly due to friction between the toner and the friction film. The magnetism resistance type magnetic sensor 14 detects remaining amount of the toner in the replenishing chamber. In

other words, magnetic sensor 14 does not detect a distance to friction film 18b. Koshino does not disclose calculation of the remaining amount of the toner based on a distance between the magnet sensor and the friction film 18b.

Thus, Applicants submit that Koshino fails to teach or suggest at least the claimed “detection auxiliary member.”

Furthermore, Applicants submit that Koshino fails to teach or suggest the claimed “scraping out member.”

Koshino discloses first and second upper walls 19a and 19b and the toner transporting sheets 13a and 13b serving as scraping members. In Koshino, the first and second upper walls 19a and 19b are fixed and immobile (Koshino at col. 8, lines 27-34). In the present invention on the other hand, the scraping-out member is movable.

Koshino discloses sheets 13a and 13b composed of a base film 18a and a friction film 18b laminated on the tip portion of the base film 18a at its front side in the rotational direction of a rotating member. When the remaining amount of toner is sufficient, the sheets 13a and 13b are rotated by a rotation of the stirring member without touching the housing. On the other hand, the scraping-out member of the present invention is composed of a base portion 12a and a free end 12b, and is formed so that the cross section shape perpendicular to the stirring axial line has a substantially V-letter shape. The free end 12b slidably contacts the inner peripheral surface of at least the lower portion of the housing while elastically abutting thereagainst.

At least for this reason, Applicants submit that Koshino fails to teach or suggest at least the claimed “scraping-out member.”

Accordingly, Applicants request that the rejection be reconsidered and withdrawn.

In view of the above amendment, applicant believes the pending application is in condition for allowance.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Robert W. Downs Reg. No. 48,222 at the telephone number of the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37.C.F.R. §§1.16 or 1.147; particularly, extension of time fees.

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Respectfully submitted,

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